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1. GAS INDUSTRY

A-Bomb Gas Tests

Hood, H. C. HOW GAS SURVIVED THE A-BOMB TEST. *Gas*, 31, 53-56 (1955) June.
A report on the Atom bomb tests conducted jointly by the Federal Civil Defense Administration and the AEC in which LP-gas and natural gas storage, piping and appliances were subjected to A-bomb blasts. R. F. Bukacek

Johnson, R. GAS INSTALLATIONS SURVIVE A-BOMB. *Amer. Gas J.*, 182, 12-15 (1955) June.
The importance of gas in the event of an A-bomb attack is emphasized. Gas appliances were installed in houses to be bombed in Survival City on Yucca Flat. Outdoor gas meters, regulators and house connections withstood the blast and remained in operating order, metal on ranges and refrigerators became buckled but remained in operating condition. Electric facilities were down, so only gas (LP) could be brought in for the emergency, for mass feeding, heating and sterilization. Propane tanks were hurled through the air, but did not explode and were completely re-useable.
J. G. Chalcraft

Construction Programs

$811 MILLION BUDGETED FOR PIPELINE BUILDING IN 1955 DESPITE TRANSCANADA POSTPONEMENT. *Gas* 31, 129-135 (1955) May.
A survey into the construction budgets for 1955 of the major gas transmission companies is reviewed. The report lists the companies, the projects they will build in the year, how much money will be spent for the projects, and where the projects will be in operation. Pipeline progress maps are included to show the location of major construction programs.
Publisher's Abstract

1955 GAS CONSTRUCTION TO TOP $1 BILLION FOR FIFTH STRAIGHT YEAR. *Gas*, 31, 37-44, (1955) May.
A comprehensive review of the construction programs for 178 major gas distribution and transmission companies. The report breaks down expenditures into major components of transmission, production, storage, distribution, and general for each company.
Publisher's Abstract

Cost of Transmission

Wormsley, B. H. THE COST OF GAS TRANSMISSION AND COAL TRANSPORT. *Coke and Gas* (British), 17, 143-48, April; 189-93 (1955) May.

To determine whether future gas works should be located at the coal mines or at the areas of gas demand, a study is presented which compares costs of gas transmission and coal transport under British conditions in 1951. Plant and pipe costs, compression and load factor are discussed in detail, with conclusions favoring mine location of gas manufacture. Part 2 includes an analysis of the use of expansion turbines at distribution points for the generation of electricity. R. F. Bukacek

Gas Safety

Turner, C. C. GAS IS THE SAFEST FUEL. *LP-Gas*, 15, 41-44 (1955) May; *Gas Age*, 115, 37-9 (1955) June 16.

An analysis of various statistical data, especially U.S. Department of Health, Education and Welfare report Volume 40, No. 1. "Deaths and Crude Death Rates". In 1951 and 1952 the direct and indirect deaths per million services were appreciably lower for gas than for electricity. R. F. Bukacek

Price Regulation

Heyke, J. E. FULBRIGHT BILL SHOULD BE AMENDED. *Gas Age*, 115, 37-39 (1955) June 16.

Objections to the favored nations, price redetermination, price renegotiation and spiral clauses in the Fulbright Bill are presented from Senate hearing testimony on the basis of Brooklyn Union's experience with natural gas prices since 1951. H. R. Linden

Trans-Canada Line

DEADLINES EXTENDED. *Oil Gas J.*, 53, 60 (1955) May 2.

Trans-Canada has been given until October 31 to finance their projected line from the gas field of Alberta to Eastern Canada. The new schedule calls for construction work to begin by June 30, 1956. B. E. Eakin

2. APPLIANCES

Air Conditioning

GAS AIR CONDITIONING: COLEMAN REPORTS PROGRESS. *Gas Age*, 115, 31, 62, 63 (1955) May 19.

The Coleman Co. has been making an all-out effort to develop satisfactory air conditioning systems using gas fuel. At present, a unit which replaces electric power with gas engine power is in an advanced stage of development. Field tests will be conducted on this unit during this cooling season, and if results are as satisfactory as expected, limited production will begin in 1956 with sharply increased production in 1957. In addition to the gas engine model, progress is being made in Coleman-sponsored research on the binary jet system by A. D. Little, Inc., on the adsorption system by Texas College of Arts and Industries, and on the open absorption system by the Institute of Gas Technology.

E. F. Searight

GAS MOTOR AC TAKING FINAL EXAMS. *Refrigerating Eng.*, 63, 71, 72 (1955) June.

The Coleman Company's gas-powered summer air conditioner is described. The unit embodies air-cooled gas-driven motor operating a compressor, a liquid chiller and evaporative condenser. Operating features are described and some cost estimates are given. J. F. Reed

Appliance Manufacture

HOW RCA ESTATE MAKES OVEN LINERS. *Appliance Mfr.*, 3, 25-27 (1955) June.

Two large, identical multi-gun welders give improved products and doubled efficiency at Hamilton, Ohio, plant of the RCA Estate Appliance Corp. The machines make 30-in. and 40-in. oven liners for the firm's sixteen range models.

J. G. Chalcraft

PUTTING THE MAGIC BACK INTO MAGIC CHEF. *Appliance Mfr.*, 3, 42-43 (1955) June.

The new management has taken decisive steps to swing Magic Chef, Inc., back towards its basic gas cooking business. Streamlining of range models, dropping of certain lines of appliances, sale of excess plant and decentralization of sales has returned the company to a strong position. Author's Abstract

Heat Pump

McLean, G. O. THE DUAL-PURPOSE DOMESTIC HEAT PUMP. *J. Inst. Fuel* (British), 28, 224-28 (1955) May.

Following a historical introduction, the paper outlines the principles involved, gives consideration to heat-balance requirements, and deals with the size and type of control needed, installation and operational problems, and the economics and future applications of this type of machine. The dual-purpose machine utilizes the heat rejected at the condenser of a refrigerator for hot water service. J. F. Reed

House Heating

Buchberg, H. ELECTRIC ANALOGUE PREDICTION OF THE THERMAL BEHAVIOR OF AN INHABITABLE ENCLOSURE. *Heating, Piping and Air Cond.*, 27, 131-39 (1955) June.

The use of an electrical resistance-capacitance network to provide electrical flows analogous to the heat flows in an idealized test house is described. Experimental results obtained from the one-room test house were shown to compare favorably with the predicted values.

R. T. Ellington

Rea, T. H. PREVENTING STEAM SHORT CIRCUITING. *Heating, Piping, Air Cond.*, 27, 100-03 (1955) June.

Proper trapping and manifolding methods are described for a number of cases in which pressure differences would prevent proper steam and condensate flow. R. T. Ellington

Thomas ,M. K. A METHOD FOR DETERMINING WINTER DESIGN TEMPERATURES. *Heating, Piping, Air Cond.*, 27, 155-58 (1955) May.

A logical method of arriving at winter design temperatures for Canadian conditions is described. The method makes use of the probable frequency of occurrence of low temperatures during January. A tabulation of design temperatures on four different bases of frequency of occurrence is presented for 15 Canadian localities and these temperatures are compared with the design temperatures in common use. An outline map of Canada with winter design temperature lines is included. It is shown that at Toronto and Montreal, city weather stations report winter temperatures slightly higher than those read at adjacent airports.

Author's Abstract

Humidity Control

Benjamin, A. D. A SIMPLIFIED METHOD FOR MAINTAINING CONSTANT RELATIVE HUMIDITY. *Air Cond., Heating and Ventilating*, 52, 83-85 (1955) May.

In common practice, systems that are designed to maintain constant relative humidities are comprised of two cycles; heating and cooling. The system described here eliminates the refrigeration cycle completely. It depends solely on a heating and ventilating package, suitably controlled, to maintain constant humidity.

Author's Abstract

Refrigeration

Kayan, C. F. REFRIGERATING-PLANT PERFORMANCE CHARACTERISTICS BY ELECTRICAL ANALOG ANALYSIS. *Amer. Soc. Mech. Eng. Trans.*, 77, 543-48 (1955) May.

A method is developed for predicting over-all performance characteristics of an integrated machine and heat-transfer coupled system. The electrical-analog is applied to the steady-state study of refrigerating-plant performance. By obtaining solutions for different operating conditions plots of energy requirements versus temperatures can be obtained. B. E. Eakin

Pennington, W. HOW TO FIND ACCURATE VAPOR PRESSURES OF LiBr WATER SOLUTIONS. *Refrigerating Eng.*, 63, 57-61 (1955) May.

Mathematical relations have been developed for expressing vapor pressure of water solutions, containing from 50 to 68 percent LiBr, as a function of the absolute temperature. The equations were developed from boiling points measured at atmospheric pressure, vapor pressures at 86.74 F, and the heat of dilution at 77 F. Also given is an expression for heat of dilution of solutions of LiBr. Details of the experimental methods are to be reported later.

J. F. Reed

Weather Data Analysis

Parmelee, G. V., Sullivan, G. E., and Cerny, A. N. WEATHER DATA ANALYSIS FOR COOLING SYSTEM DESIGN ILLUSTRATED BY DATA FOR NEW ORLEANS. *Heating, Piping, Air Cond.*, 27, 135-140 (1955) April.

Calculation of cooling loads requires careful selection of design weather conditions which apply to the particular type of structure to be conditioned. A new method of analyzing summer weather data, described in this paper makes use of a frequency analysis using the three weather elements of daily maximum dry-bulb temperature, mean daily dew-point temperature and total daily radiation. The method is suggested as a basis on which engineers can select design days. Summer weather records for a 10-year period in New Orleans are used to illustrate the method. Authors' Abstract

3. COMBUSTION AND INDUSTRIAL FURNACES

Fuel Conversion

Pixler, R. SUCCESSFUL BOILER CONVERSION TO GAS-OIL FIRING. *Heating, Piping, Air Cond.*, 27, 116-18 (1955) March.

A number of items which must be considered to achieve a well-operating conversion of gas to oil firing are discussed. R. T. Ellington

Furnace Research

Thring, M. W. IMPROVING FURNACE PERFORMANCE BY MODEL INVESTIGATION. *Coke and Gas* (British), 17, 176-180, 184 (1955) May.

The use of furnace models to investigate heat transfer problems for open hearth furnaces is discussed. It is shown that similarity of heat transfer conditions rather than constancy of factors such as Reynolds number is necessary for proper scale-up. R. T. Ellington

COVERED ON ALL SIDES. *Chem. Week*, 76, 74, 76 (1955) June 4.

Research work on all fuels at Babcock and Wilcox Laboratories is briefly outlined. B. and W. engineers are convinced that comparatively less expensive carbon steel can replace type 347 stainless steel in nuclear reactor systems. Also higher-viscosity oils and petroleum coke can be used without difficulty in cyclone furnaces. In a different area of activity, B. and W. is finishing up process development work on its Kaolwool refractory fiber. K. C. Channabasappa

Gas Cleaning

Hedberg, C. W. and Roberts, L. M. (assigned to Research Corp.) GAS CONDITIONING METHOD AND APPARATUS. U. S. 2,706,533 (1955) April 19.

This patent relates to an improved technique for preparing hot particle-laden industrial gases for efficient gas cleaning by electrostatic precipitation. The moisture content of a portion of the gas is increased, and the recombined gas streams subjected to electrostatic dust precipitation techniques. B. E. Eakin

Yellott, J. I. and Broadley, P. R. FLY ASH SEPARATOR FOR HIGH PRESSURES AND TEMPERATURES. *Ind. Eng. Chem.*, 47, 944-52 (1955) May.

On coal-fired open-cycle gas turbines, the turbine blades must be protected from the erosion caused by the ash and coal particles carried in the hot driving gases. The Locomotive Development Committee of Bituminous Coal Research, Inc. has carried on extensive research on efficient removal of this fly ash by continuous cyclone separators. Results with six types of separators are discussed. The Dunlab type, which uses the principle of deflection vanes to create a vortex from which the dust is drained by a tangential or annular exit (blow-down) tube, has achieved over 95% efficiency of removal for 10-micron particles, at 1300° F. and up to 5 atm., at flows up to 1800 cu ft per min. The particle removal surpasses the requirements of existing smoke ordinances.

O. P. Brysch

Gas Turbine

SOLAR GAS TURBINE ENGINES. *Gas World* (British) 159, 1209 (1955) May 7.

Sugg Solar, Ltd. a new company formed in England to manufacture the American Solar Aircraft Company's "Mars" gas turbine unit, demonstrated some of the uses of this turbine in a recent exhibition. The turbine operates at 40,000 RPM on natural gas or any distillate fuel such as gasoline. The basic engine weighs less than 100 lb., and is smaller than a two-foot cube. Suggested applications are powering of small boats, land vehicles, air blowers and space heaters. E. F. Searight

Gaseous Combustion

Reitzer, B. J. and Lamb, G. G. PREFLAME OXIDATION AND DETONATION OF CYCLOPENTANE AND 2,2,4-TRIMETHYLPENTANE. *Ind. Eng. Chem.*, 47, 1239-43 (1955) June.

The kinetics of combustion of cyclopentane air and isooctane-air systems were studied to compare their antiknock characteristics. Ignition was by adiabatic compression. Empirical equations are given for the induction periods and reaction rates as functions of temperature and pressure. S. A. Weil

Wagner, P. BURNING VELOCITIES OF ISOPROPENYL AND DIISOPROPENYL ACETYLENE. *J. Amer. Chem. Soc.*, 77, 2650-51 (1955) May 5.

This note adds to the list of burning velocities of hydrocarbon-air flames being tabulated by the NACA (*J. Am. Chem. Soc.* 77, 227 (1955)). The maximum burning velocities of isopropenyl and diisopropenyl acetylene were determined using an open burner method.

S. A. Weil

Industrial Heating

Dickinson, F. and Johnson, F. J. TECHNICAL PROBLEMS IN THE UTILISATION OF TOWN GAS IN INDUSTRY. *Gas World* (British), 141, Suppl. 72, 73, 76, April 16; Suppl. 92-93 (1955) May 21.

Specific applications of gas heat are described which include ladle heating, pipe bending, and heat treatment in saw and spring manufacture. A general discussion is given of the water-hydrogen and CO_2-CO ratios in protective atmospheres as they influence the output annealing of low carbon steel. Low and high temperature oxidation are discussed along with possible troubles that could arise due to variation in various parts of the operation. (See also Gas Abs 11, 123, July) R. T. Ellington

Nuclear and Oil Fuel

TEAMS UP FISSIONING WITH OIL BURNING. *Power*, 99, 81, 200 (1955) May.

This article reveals the design of the first privately financed nuclear-fired power plant, of which the nuclear steam generator is comprised of a pressurized-water uranium-thorium con-

verter reactor (which generates saturated steam at 450 psia) and four boilers. Enriched uranium-233 obtained from conversion of thorium-232 in the reactor also supplies heat by fissioning. Installation and operating costs that compare reasonably with conventional fuel-fired plants is promised. S. Volchko

4. CARBONIZATION AND GASIFICATION

Carrier Gas Coking

Grant, A. F. and Lewis, C. H. LARGE SCALE CARRIER GAS CARBONISATION IN THE NORTH THAMES AREA. (British) Inst. Gas Eng. Research Commun. No. 468; *Gas J.* (British), 282, 369-75, May 11; 453-57 (1955) May 18. *Gas World* (British), 141, 1125-27; April 30; *Gas Times* (British) 83, 224, 26, 28 (1955) May 13.

Earlier experiments on 2 vertical retorts showed that carrier-gas injection had increased the coal throughput to 10 tons from the normal 7 tons per day. The present large-scale tests on a bench of 34 WD retorts were conducted at Bow Common Works. Metered amounts of carbureted water gas, coal gas and mixed gas were injected into the base (coke box) of the retorts, while coal input was increased. Test runs of one week were made after steady operating conditions had been attained. Injection of 8500 to 9200 cu ft carrier gas per ton coal gave coal throughputs of 11.7 to 14.0 tons/day/retort compared to 8.9 tons coal with normal operation. Irregular coal size and gas leakage at retort base interfered with attaining the best conditions, and some degradation of the gas heating value occurred, because of destruction of ethane and unsaturates. High volatile therm content of coke and high tar yields were noted. Estimates based on best operation with blue gas injection indicate that 13 tons per retort could be carbonized with a slight decrease in gaseous therm output. O. P. Brysch

Coal Chemicals

Van Waes, J. P. M. THE CHEMICAL INDUSTRY OF STAATSMIJNEN IN THE NETHERLANDS. *Gas World* (British), 141, (Coking Sect.) 101-6, 108 (1955) May 7; *J. Inst. Fuel* (British) 28, 271-83 (1955) June.

The chemical industry of the Netherlands State Mines is based upon the coking coal of South Limburg. Here the Maurits and the Emma coking plants of 8000 and 3000 tons daily capacity respectively, perform the initial conversion for the operation. The usual coal-chemicals, —ammonium sulfate, tar, benzole, and H_2S, are recovered; however the tar and benzole are worked up in extensive plants into refined products. Purified gas (56 million CF daily) is sent to the 400-mile distribution grid of South Holland, and like amounts to gas-fractionating plants for synthetic nitrogen production. Producer gas from coke by oxygen-steam gasification provides underfiring fuel for the ovens. Nitrogen production comprises 90,000 tons per year from coke-oven hydrogen, and 50,000 tons from coke synthesis gas, the latter to be increased in 1956 by 40,000 tons from new plants. This nitrogen is sold chiefly as nitrolime in Netherlands. Other chemicals include ethanol (from ethylene), phthalic anhydride, phenol, and caprolactam (for nylon). Of the 42,000 employees, 32,000 are in the collieries division, 7500 in the chemical, and 2500 in the service departments. A school provides technical courses for helping employees to attain several grades of training. Statistics of the enterprise are presented in the graphs. O. P. Brysch

Coal Gasification

Phinney, J. A. (assigned to Pittsburgh Consolidation Coal Co.) TREATMENT OF AGGLOMERATIVE CARBONACEOUS SOLIDS. U. S. 2,709,675 (1955) May 31.

Agglomeration of fresh feed solids in a fluidized treating vessel is prevented by introducing the solids into the interior of the fluid bed by a jacketed and cooled inlet pipe extending a sufficient distance in the bed. Introduction velocities range from 5 to 30 fps. A cylindrical baffle inside the fluid bed augments the mixing action and promotes upflow through the center of the bed and downflow along the walls.

C. G. von Fredersdorff

Rummel, R. CARBONIZATION AND GASIFICATION OF BITUMINOUS MATERIAL. U. S. 2,709,153 (1955) May 24.

Difficulties arising from the condensation of water vapor in the preheating zone, causing an increase in the friability of lump fuels in conventional fixed bed carbonization and gasification equipment are overcome by introducing

into the carbonization shaft, a stream, or streams of drying and preheating gases.

C. G. von Fredersdorff

Fluidized Coking

Totzek, F. (assigned to Koppers Co., Inc.) PROCESS FOR PRODUCING FINELY DIVIDED COKE FROM BITUMINOUS FUELS. U. S. 2,709,152 (1955) May 24.

Finely divided, degasified coke for electrode manufacture is prepared from pulverized (—2 mm) pitch or other bituminous solids by injecting these in suspension in an oxygen-containing gas into a reaction chamber held at a temperature of 1500° C. Highly preheated gaseous medium is injected in an annular stream surrounding the suspension to maintain the temperature. An upper settling zone and a lower particle-collecting zone are provided. The gas treated for heat recovery and dust removal may be used as synthesis gas. O. P. Brysch

Indian Coke Plant

THE JAMSHEDPUR COKING PLANT. *Coke and Gas* (British), 17, 127-32 (1955) April; 167-172, May.

The coke oven plant of Tata Iron and Steel Co. at Jamshedpur, India, is described. The plant consists of 4 batteries of 55 Simon-Carves ovens each, with a capacity of 5200 tons of coal a day. The capacity of each oven is 24 tons a day and high-ash coal containing 3 to 4 percent moisture is used. One new battery has gone into operation recently. K. C. Channabasappa

Lignite Fuel

Lykken, H. G. APPARATUS FOR PRODUCING LIGNITE FUEL PRODUCT. U. S. 2,708,654 (1955) May 17.

A two-stage rotary-kiln furnace for processing lignite is claimed. In the first of the stages, crushed lignite mixed with heavy liquid hydrocarbon oils is heated by combustion-gas jackets to 250° F., with expulsion of much of the moisture content. The heated charge passes through a sealed junction hopper to the second stage, where the 600° F. temperature removes the remaining water and cracks the hydrocarbon to form a binder for agglomerating the solids into a hard stable pelletted fuel, of improved heating value for domestic and industrial use.

O. P. Brysch

Oil Gas

Haug, J. S. (assigned to United Engineers and Constructors, Inc.) METHOD FOR PRODUCING OIL GAS. U. S. 2,709,646 (1955) May 31.

A three-shell, cyclic thermal cracking high-Btu oil gas process is disclosed which has as its main novel feature the use of an empty combustion chamber for providing the necessary process heat at a high rate by downward firing.

H. R. Linden

Voelker, J. G. HOW TO LICK A LINE BREAK. *Gas Age*, 115, 23-27 (1955) June 2.

The emergency use of one seven- and one eight-foot high-Btu oil gas set operating on distillate fuel oil is described. Continuity of gas supply to 10000 customers was maintained during a 30-hour period when an eight-inch high pressure natural gas line was severed near Kingston, N. Y. H. R. Linden

Walters, W. J. OIL GASIFICATION. *Gas Times* (British), 83, 81-4, 108, April 15; 158 160, 162, 164-66 (1955) April 29; *Gas World* (British), 141, 1065-72 (1955) April 23.

Faced with a contraction in the supply of suitable coals and an increased demand for gas the British gas industry has been developing improved methods for utilization of oils in gas making. Here because of great demand for heavy fuel oils, considerably flexibility in processes is needed to produce gas economically from the petroleum products available. Planned increases in water gas capacity will increase gas oil consumption from 437000 tons in 1953 to 577000 tons in 1960. In water gas processes, the injection of heavy oil into the generator (with "marginal air") or into checkerless carburetors (with cyclic combustion of carbon) as practised in the U.S.A. has not been strictly economic in Britain. The Saltley split-checker carburettor, with 50% of heavy oil injected in generator gave 461 Btu gas, but at a reduced thermal yield. Similar split injections on 3.75 MMCFD sets (H & G) at Brentford (N. Thames) gave good results. In America, thermal cracking with steam, with cyclic carbon burn-off has successfully produced 570 Btu or higher gas in remodelled water gas shells. The Hall and the Jones new oil gas processes are

summarized from Morgan's description. A partial combustion process for distillate oils used at Southall and Southend works of the G. L. and C. Co., is a modified "Improved Dayton" process, cracking at 720° C. to yield 514 Btu gas. The Segas plant of Stanier and McKean at Sydenham, which uses alkaline earth catalysts is reviewed in detail, as are also the results of the ONIA-GEGI (nickel catalyst) plant at Stafford. Both of these latter processes give total cost results comparable with base load coal gas.

O. P. Brysch

Sulfur Removal

McCarthy, J. W. (assigned to Phillips Petroleum Co.) RECOVERY OF ELEMENTARY SULFUR FROM GASES. U. S. 2,708,983 (1955) May 24.

An object of this invention is to provide a method for the operation of a water condenser for the recovery of sulfur from a gas stream without the production of sulfur fog in the gas stream so that subsequent removal of final quantities of sulfur may be efficiently carried out. This is achieved by operating a water condenser with a relatively low water level surrounding the condenser tubes in such a manner that heat is slowly removed from the gas stream in a portion of the condenser above the water level. In this manner a considerable portion of the sulfur is condensed on the walls of the tubes and formation of fog is avoided.

D. M. Mason

Walker, H. C. TRANSPORTATION OF BOG ORE. *Gas J.* (British), **281**, 854-6 (1955) March 30.

Problems associated with the digging of bog iron ore in the low countries, purchasing, and transportation to Great Britain are discussed.

D. M. Mason

Synthesis Gas

Hill, R. M. and Lynch, C. S. (assigned to Esso Research and Eng. Co.) PRODUCTION OF INDUSTRIAL GASES. U. S. 2,709,645 (1955) May 31.

The present invention is based on the discovery that, contrary to expectation, if free iron is included in the reaction mixture at the outset in an amount bearing a predetermined relation to the amount of iron oxide present, the reaction progresses much more smoothly with a high selectivity for the production of carbon monoxide and hydrogen and with practically no formation of carbon. The amount of free iron to be incorporated in the reaction mixture varies within limits which may be generally expressed as being such that the atomic ratio between oxygen and iron in the mixture is between 1.25 and .5 to 1, which is equivalent to an oxygen concentration of about 12.5 to 26.3% in the said mixture, at least 2/15 of a gram atom of free iron being present per gram atom of oxygen. This ratio of iron to combined oxygen may readily be achieved by a suitable combination of free iron with iron oxides. A very effective combination is one in which one gram atom of free iron is combined with one gram mol of Fe_2O_3. The reaction temperature, for example, may vary between 1600° and 2000° F. The pressure maintained in the reactor can be varied over a fairly wide range, up to about 600 lbs./sq. in. The rate at which the feed gas is passed over the contact mixture may also be varied within substantial limits as from at least 5.0 v./v./hr. to as high as 500 v./v./hr. and will, in general, be higher the higher the temperature employed. Authors' Extracts

Pfeiffer, C. and Sandler, H. J. AMMONIA FROM CAT REFORMER OFF-GAS. *Petroleum Ref.*, **34**, 145-52 (1955) May.

The economics of producing ammonia synthesis gas from catalytic reformer off-gas by six purification schemes have been worked out and are presented in this paper. Off-gases containing from 77 to 95 mole percent hydrogen were used for this study since they were found to represent the range of actual operations in commercial practice. Low temperature separation was found to be the most economical and the least versatile process for the condition selected. Reforming with 95 percent oxygen and partial combustion were the next most favorable processes. The results of the study for all of the processes at three different off-gas compositions covering the above range are presented in tabular and graphical form. J. M. Reid

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Condensate Removal

Guinot, H. M. RECOVERY OF CONDENSABLE COMPONENTS FROM A GAS AND VAPOR MIXTURE. U. S. 2,708,490 (1955) May 17.

This patent describes a process for recovery of condensable components from a gas and vapor mixture by passing the gas through a cooling fluid, part of the refrigeration being recovered from the gas by passing it through a second column through which the denuded refrigerating liquid is passed. R. F. Bukacek

Drilling

Rosu, G. G. THE TURBINE DRILLING SYSTEM AND ITS APPLICATION IN THE U. S. S. R. *World Petroleum*, 26, 84-88 (1955) March; 38-41, April.

The technique of turbine drilling is discussed. The first turbo-drill, designed by Kapelyushnikov in 1923, is illustrated along with many of the new developments. The theory and mathematics of this system are outlined. In the second part of the study the drilling fluids and pumps required by this method together with operating results obtained from Soviet sources are discussed. B. E. Eakin

Dust Removal

Hedberg, C. W. (assigned to Research Corp., New York) GAS CLEANING APPARATUS. U. S. 2,708,486 and 2,708,487 (1955) May 17.

These patents relate to improved types of combination electrostatic and mechanical devices for removing suspended particles from gases. E. J. Pyrcioch

White, H. J. MODERN ELECTRICAL PRECIPITATION. *Ind. Eng. Chem.*, 47, 932-39 (1955) May.

Basic principles of electrostatic particle precipitation are discussed. Equations are derived for particle collection efficiency for cases of uniform and non-uniform particle size distributions and for pipe and duct-type precipitators. The fundamental equations are shown to apply with reasonable accuracy under controlled laboratory conditions but are found to give higher performance values than obtained in practice in field tests. Engineering application to industrial gas cleaning problems are discussed as regards optimum performance. E. J. Pyrcioch

Exploration

Prescott, B. O. GRAPHICAL METHOD FOR CALCULATING DIP AND STRIKE FROM CONTINUOUS DIPMETERS. *Oil Gas J.*, 53, 118-19, 122, 125 (1955) March 7.

A computation procedure and set of graphs to facilitate these calculations are presented. A very detailed outline of the procedure is given, both for usual and unusual circumstances. This technique can be used with accuracy where dip is up to 88°, with an average error of only ½° in dip and 1° in strike. B. E. Eakin

Flooding Techniques

Breston, J. N. NEW DEVELOPMENT FOR SELECTIVE PLUGGING IN WATER FLOODS. *Producers Monthly*, 19, 26-33 (1955) May.

The use of organic powders and fibers for plugging fractures, vugs and highly permeable streaks in reservoir rocks to prevent oil bypassing in flooding operations is described. The organic materials are insoluble in saline solutions usually encountered in formations but soluble in dilute caustic. Their use to cure leaking packers is also described. R. T. Ellington

Croes, G. A. and Schwarz, N. DIMENSIONALLY SCALED EXPERIMENTS AND THE THEORIES ON THE WATER-DRIVE PROCESS—T.P. 4009. *J. Petroleum Techn.*, 7, 35-43 (1955) March.

A series of model displacement experiments for measuring the efficiency of water-drive process are reported. These are essentially a continuation and extension of the work of Engelberts and Klinkenberg. Detailed information on the influence of the oil/water viscosity ratio was obtained, and the results are presented in graphical form from which water/oil ratio and oil recovery as a function of total oil plus water production for viscosity ratios between 1 and 500. The theories of Buckley and Leverett, and of Dietz are presented, and the

data reviewed according to each. A discussion of the physical background of the theories indicates why Dietz's fails to agree with some of the experimental results. B. E. Eakin

Paez, J., Reed, P., and Calhoun, J. C. Jr. RELATIONSHIP BETWEEN OIL RECOVERY, INTERFACIAL TENSION, PRESSURE GRADIENT IN WATER WET POROUS MEDIA. *Producers Monthly*, 19, 34-39 (1955) May.

Tests are discussed which show that in displacing two hydrocarbons from water-wet cores the lowering of oil phase residuals was obtained at low values of interfacial tension and high applied pressures. It is recommended that further work include consideration of pressure gradient or velocity rather than overall pressure difference as done here.

R. T. Ellington

Fracturing

Bell, A. H. FRACTURING REJUVENATES ILLINOIS PRODUCTION. *Oil Gas J.*, 53, 168-69 (1955) April 11.

The oil production history and the stratigraphic distribution of Illinois is reviewed briefly. A table and map give the oil production through 1954, a total of 1,756 million bbls. Fracturing has increased production from existing wells, and resulted in obtaining production from wells previously completed as dry holes. Water flooding and the Chester production are also discussed. B. E. Eakin

Hauck, C. J. FORMATION FRACTURE OPERATIONS IN OHIO. Amer. Gas Assoc. Opertg. Sect. Paper GSTS-55-6 (1955) May 9; *Producers Monthly* 19, 26-33 (1955) June.

The hydraulic fracturing process for increasing production has been widely accepted in Ohio. The first treatment was in 1951, and as of November 30, 1954 there had been a total of 402 "hydrofrac" treatments. The increases obtained by this method are illustrated by production figures. Completing storage wells by this method reduces the number required by increasing the potential of each well, and results in considerable decrease in storage investment. Multiple fracturing in refracturing are discussed. B. E. Eakin

Gas Separation

Campbell, J. M. ELEMENTS OF FIELD PROCESSING: KNOW YOUR SEPARATORS; HOW PRESSURE AFFECTS OIL AND GAS SEPARATION. *Oil Gas J.*, 53, 107-11, March 14 122, 124-125 (1955) April 11.

The effect of separator pressure and temperature, and well stream composition, on the recovery of liquid products is discussed. The fundamental equilibrium equations are given, and examples of calculated recoveries at different pressures are included. The effect of pressure on K values and the phenomena of retrograde condensation are discussed.

B. E. Eakin

Campbell, J. M. ELEMENTS OF FIELD PROCESSING: HANDLING OF SEPARATOR LIQUID-STAGE SEPARATION. *Oil Gas J.*, 54, 91-93 (1955) June 20.

The field liquid handling by use of staged separators is discussed. A rough rule of thumb for determining operating pressures and number of stages for most economical investment and recovery of various gravity crude oils and condensate systems is given. Three examples are given. B. E. Eakin

Lovelady, I. W. and Kroeker, S. P. (assigned to Sivalls Tanks, Inc.) GAS AND MULTIPLE LIQUID SEPARATOR APPARATUS. U. S. 2,706,531 (1955) April 19.

This patent relates to improvements in separating well stream fluids, particularly when found in the presence of water emulsions, into multiple liquid streams and a gas stream.

B. E. Eakin

Hydrocarbon Equilibria

Grosberg, J. A. and Mapstone, G. E. SHORT CUT TO V-L EQUILIBRIA SOLUTIONS. *Petroleum Refiner*, 34, 193-96 (1955) March.

A set of nomographs are given which permit calculation of vapor-liquid equilibria ratios for mixtures of hydrocarbons, based on the ethane + fraction. The system is limited to mixtures where the K values of only three of the components are either greater than 1 or less than 1. The value of L/V read from the chart can be used as the first approximation in a numerical equilibria calculation. B. E. Eakin

Line Pressures

Hangs, F. E. DETERMINING OPERATING PRESSURES. *Oil Gas J.*, 53, 100-01 (1955) May 2.

A graphical method is presented for solving for gage pressures corresponding to specific rates of flow at various points in a closed products pipeline system. This method can be used very effectively by the dispatching office.

B. E. Eakin

Logging

Uren, L. C. PROGRESS IN WELL-LOGGING TECHNIQUES. *World Petroleum*, 26, 80-83, 96, 98 (1955) March.

The recent advances in well logging equipment and techniques are discussed. A brief summary of the history of logging is included, and samples of electric log, radio-activity log, and mud log records are included. B. E. Eakin

Pipe Line

Sterrett, E. GULF INTERSTATE GAS LINE HAS MANY NOVEL FEATURES. *Pipe Line News*, 27, 24-35 (1955) May.

Some of the unusual features are discussed in the design, construction and organization of the Gulf Interstate Gas Company's pipe line system. Included are photos of some of the equipment.

R. F. Bukacek

Pipe Line Flow

Baker, O. and Swerdloff, W. SPEED UP FLOW CALCULATIONS FOR DESIGN OF GAS-GATHERING SYSTEMS. *Oil Gas J.*, 54, 148-156, 158, 160, 163 (1955) May 16.

A method of graphical solution for the generalized flow equation is presented with a discussion of factors important to the design of gathering systems. R. F. Bukacek

Pipe Stresses

Lester, C. B. HYDRAULICS FOR PIPELINERS. PART XI: WORKING STRESSES. *Pipe Line News*, 27, 35-40 (1955) June.

A discussion of the various standards used in determining allowable working stresses in oil pipelines. R. F. Bukacek

Porosity Tests

Schmid, C. and Woodruff, M. L. GROUP EXPERIMENTS TO TEST THE RELIABILITY OF POROSITY AND PERMEABILITY MEASUREMENTS IN CORE SAMPLES. *Producers Monthly*, 19, 21-25 (1955) June.

The results of a group of experiments carried out in five different laboratories are compared. It is concluded that the impregnation method is the best for porosity determination.

R. T. Ellington

Reserve Estimates

METHODS OF ESTIMATING NATURAL GAS RESERVES. *Gas*, 31, 155, 158 (1955) March.

A brief appraisal of the volumetric and the pressure-decline methods of estimating the volume of gas in reservoirs. The assumptions and accuracies of each technique are discussed.

B. E. Eakin

Sealed Sand Storage

SANDSTONE PLUS SEALANT EQUALS LOW-COST STORAGE. LP-Gas, 15, 71-73 (1955) May.

United Petroleum Gas Company reports on its solution to the underground storage problem for LP-Gas. A water emulsion of neoprene and a silicone resin are used to seal sandstone; the process is reported successful in air pressure tests to 160 psi, and in propane storage.

R. F. Bukacek

Storage

Crutchley, W. F. DISTRIBUTION OF GAS FROM STORAGE TO MARKET. Amer. Gas Assoc. Opertg. Sect. Paper GSTS-55-11 (1955) May 9-10.

Some of the problems encountered by dispatchers handling storage and transmission supply are outlined. The types of loads handled by the Consolidated System and the problems associated with each are discussed. Base load and peak load pools and their use in meeting the fluctuating demand for natural gas are also discussed. B. E. Eakin

Scott, C. UNDERGROUND STORAGE AND ITS RELATION TO GAS DISPATCHING. Amer. Gas Assoc. Opertg. Sect. Paper GSTS-55-17 (1955) May 9-10.

The underground storage projects utilized by the Oklahoma Natural Gas Co. are discussed.

Graphs illustrating the monthly fluctuation in firm, industrial, and total gas sales from 1948-1954 are included. A specimen of a volume-day demand curve typical of the fields utilized by this company is presented, and the use of these curves is outlined. B. E. Eakin

Stratigraphy of Reservoirs

Haught, O. L. CONDITIONS FOR THE PRESERVATION OF EARLY PALEOZOIC OIL. *Producers Monthly*, 19, 17-19 (1955) May.

Discussion is presented supporting the contention that if early Paleozoic Reservoirs in western West Virginia ever contained oil and gas they probably still contain them. If accumulations exist in the deeply buried early Paleozoic rocks their locations are thought to be controlled more by lithology than structure, and stratigraphic rather than structural traps will be of importance to the wild-catter.

R. T. Ellington

Thiophene Removal

Hines, R. A. (assigned to E. I. du Pont de Nemours and Co.) THIOPHENE CONVERTING PROCESS. U. S. 2,709,195 (1955) May 24.

Thiophene is converted to products which are free of organic sulfur and which are readily separable from benzene, by reaction with sodium metal in the presence of an alcohol at temperatures from 35 to 85° C. Products are C_4 olefins and sodium sulfide.

D. M. Mason

Turbine Compression

Heard, T. C. CENTRIFUGAL COMPRESSORS FOR GAS PIPELINES. *Oil Gas J.*, 53, 123-6, 129 (1955) April 25.

The steps involved in selecting a centrifugal compressor using gas turbine drive for gas pipeline pumping are described and illustrated.

R. F. Bukacek

Well Completion

OPERATION AND EQUIPMENT OF DUALLY-COMPLETED WELLS. *World Petroleum*, 26, 66-69, 91 (1955) March.

The present day practices and equipment which are used in multiple completion of wells are discussed. The various types of wire line equipment is illustrated, and the advantages and disadvantages outlined. B. E. Eakin

Well Pressures

Sukkar, Y. K. and Cornell, D. DIRECT CALCULATION OF BOTTOM-HOLE PRESSURES IN NATURAL GAS WELLS—T. P. 4010. *J. Petroleum Techn.*, 7, 43-48 (1955) March.

The results of a series of numerical integrations of the fundamental fluid flow differential equation are presented in graphical and tabular form. These values are suitable for direct calculation of vertical gas flow problems, and the static or flowing bottom-hole-pressures may be calculated by this method without resort to trial and error procedures. A constant average temperature was assumed for the integration.

B. E. Eakin

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Catalysts

Mattox, W. J. and Buchman, F. J. (assigned to Esso Research and Eng. Co.) PROCESS FOR THE SYNTHESIS OF HYDROCARBONS EMPLOYING A HYDROGEN-SINTERED PYRITES ASH. U.S. 2,708,674 (1955) May 17.

The invention relates to improvements in the reduction of the oxides of carbon to produce relatively high molecular weight hydrocarbons in the presence of a powdered iron catalyst which is maintained in the form of a fluidized bed in a reaction zone. J. G. Chalcraft

RESEARCH DWELLS ON CATALYST POISONS. *Petroleum Ref.*, 34, 181-183 (1955) May.

Papers presented at the Analytical Session of the API Division of Refining are reviewed here.

D. M. Mason

Desulfurization

McAfee, J., Montgomery, C. W., Summers, C. R., Jr., Hirsch, J. H. and Horne, W. A. THE GULF HAS PROCESS FOR UPGRADING CRUDES AND RESIDUES. *Oil Gas J.*, 54, 196-200, 202, 204 (1955) May 16; *Petroleum Refiner* 34, 156-62 (1955) May.

The Gulf HDS process is a moderate-pressure process which converts heavy residual fractions to lower-boiling distillate products while simultaneously effecting substantial desulfurization

of all fractions of the charge stock. The process involves the use of a rugged compound-supported-metallic catalyst which maintains good activity even after repeated regeneration and in spite of the deposition of considerable amounts of metallic contaminants. Typical results, choice of operating conditions, investment cost, and chemical and utility requirements are discussed. D. M. Mason

Zimmerschied, W. J., Hunt, R. A., Jr. and Wilson, W. A. IMPROVING DISTILLATE FUELS BY HYDROFINING. *Oil Gas J.*, 54, 113-14 (1955) May 23.

Hydrofining of a distillate from high-sulfur West Texas crude oil improved its quality to that of Mid-Continent distillate, with no loss of liquid product. Desulfurization was essentially complete, product was sweet, and objectionable odor eliminated. The burning quality was measured by smoke point and by a full-scale burner test. The smoke point, a measure of sooting tendency, was improved by means of Hydrofining. Combustion deposits in the burner test were markedly lowered. Hydrogen consumption during Hydrofining was calculated from the hydrogen content of the feed and the products. Consumption of 90 standard cubic feet per barrel of feed increased the smoke point from 33 to 37; consumption of 300 standard cubic feet increased it to approximately 48. Authors' Abstract

Extractive Crystallization

Fetterly, L. C. UREA COMPLEXES . . HOW THEY'RE APPLIED. *Petroleum Refiner*, 34, 134-7 (1955) April.

One of the newest petroleum segregation techniques is extractive crystallization with urea or thiourea. Straight-chain hydrocarbons are selectively removed from gasolines to heavy distillates. The process is flexible and may be used in many applications, the most important of which are discussed. Sixty-nine references are given. E. B. Shultz

Hydrogenation

Harper, J. I. and Luther, M. W. (assigned to Sun Oil Co.) PROCESS FOR HYDROGENATING HYDROCARBON OILS. U. S. 2,706,167 (1955) April 12.

This invention relates to the treatment of hydrocarbon oils with hydrogen and particularly concerns a continuous catalytic process for effecting hydrogenation of hydrocarbon oils in liquid phase. According to the invention the charge oil is fed in liquid phase into a contact zone containing a suitable quantity of hydrogenation catalyst in particulate or finely divided form. A stream of hydrogen gas is introduced into the lower part of the contactor and at such a rate that the catalyst is suspended, or maintained in a state of hindered settlement, in the oil. This effects intimate contact between the catalyst and oil in the presence of the hydrogen. The catalyst-oil mixture flows upwardly from the contact zone into an enlarged separation or settling zone adapted to permit the catalyst to settle from the treated oil and return to the contact zone where it commingles with further amounts of charge oil. Treated oil from which all or the bulk of the catalyst has been separated is withdrawn from an upper level of the settling zone, while excess hydrogen is removed therefrom at a still higher level and may, if desired, be recycled to the contact zone for re-use. Authors' Abstract

Pressure Maintenance

Stewart, F. M., Garthwaite, D. L., and Krebill, F. K. PRESSURE MAINTENANCE BY INERT GAS INJECTION IN THE HIGH RELIEF ELK BASIN FIELD. *J. Petroleum Techn.*, 7, 49-57 (1955) March.

The pressure in the Elk Basin Tensleep reservoir has been maintained since September 1949 by the injection of inert gas. Oil is being produced under conditions favorable for gravity drainage, and a high percent recovery of oil-in-place is being obtained. Other advantages are sustained field productivity, reduced operating problems, and recovery of plant products and heat. B. E. Eakin

7. ANALYTICAL METHODS AND TESTS

Air Microanalysis

Monkman, J. L. GAS CHAMBER MICROAPPARATUS IN IDENTIFICATION OF AIRBORNE POLLUTANTS. *Anal. Chem.*, 27, 704-8 (1955) May.

In the identification of air pollutants, samples on microslides, glass wool, or other holders are exposed to reagents in the vapor phase. The

reactions are carried out in gas chambers of borosilicate glass constructed from the two sections of a standard-taper joint. By breaking the chamber at the joint the sample may be inserted and the joint closed, after which the sample may be exposed to a gaseous reagent or to several in succession. During the vapor treatment, microslide samples may be withdrawn at intervals for microscopic examination and photomicrographing. The composition of the effluent gas may be investigated by the use of paper disks sensitized for gases such as arsine, or by infrared investigation of organic material caught on silica gel contained in absorbers downstream from the reaction chamber.

Author's Abstract

Ceramic Grinder

Bloom, H. and Barnett, P. R. A NEW CERAMIC BUCKBOARD AND MULLER. *Anal. Chem.*, 1037-8 (1955) June.

A buckboard and muller made from a high alumina ceramic was found to grind faster than an agate mortar and to introduce much less metal contamination than a steel buckboard. D. M. Mason

Fractionation

Muller, R. H. PORTABLE APPARATUS ANALYZES MULTICOMPONENT MIXTURES BY FRACTIONAL SEPARATION OF VAPORS IN PARTITION COLUMN. *Anal. Chem.*, 27, A33, 34, 36 (1955) June.

A new apparatus by which vapors of organic compounds can be separated chromatographically, cut points located by thermal conductivity, and amount of component measured, is described. D. M. Mason

Podbielniak, W. J. and Preston, S. T. HYDROCARBON ANALYSIS MADE MORE ACCURATE, SPEEDY. *Petroleum Eng.*, 27, C17-19, 22-25 (1955) May.

The sources of error in low temperature fractional distillation analysis are reviewed and recent improvements in the apparatus manufactured by Podbielniak, Inc. are described. The latter include: recording of the thermal conductivity of the vapor distillate to locate more precisely the break point between components, with simultaneous recording of the boiling point, means for mixing of selected fractions and reanalysis thereof by thermal conductivity; improved column control allowing faster distillation with more automatic control, based on measuring the difference in reflux temperature between the top of the column and a point 2 to 3 inches lower; an improved receiver manometer and a stopcock lubricant having low sorptivity toward hydrocarbons. D. M. Mason

Hydrocarbons in Gas

Kirk, E., Jr. THE CHARCOAL WEIGHT TEST. *Oil Gas J.*, 53, 148-150, 152, 155 (1055) April 18.

The charcoal weight test for determining C_3+ and C_4+ content of natural gas has been modified at the Snyder gasoline plant for use in field-wide unit gas-allocation testing. After modifying the test method so as to test under atmospheric pressure and shortening the calculation procedure, its accuracy has been established at within 3 per cent on C_3+ gal. per MCF and within 6 per cent on C_4 gal. per MCF when compared with fractional analysis. Principal application for the test to date has been on information surveys to obtain data on gas quality which cannot otherwise be obtained except by laboratory methods. D. M. Mason

Ore, F. and Moulton, R. W. ADSORPTION OF BINARY HYDROCARBON MIXTURES ON ACTIVATED CHARCOAL—MOLECULAR WEIGHT VARIATION. *J. Air Pollution Control*, 5, 33-36, 63 (1955) May.

Apparatus, method, and results of a study of the amount of hydrocarbon gases adsorbed on carbon, and influence of mixture composition and molecular weight are reported.

D. M. Mason

Nitrogen Method

Adams, C. I. and Spaulding, G. H. DETERMINATION OF ORGANIC NITROGEN BY KJELDAHL METHOD WITHOUT DISTILLATION. *Anal. Chem.*, 27, 1003-04 (1955) June.

The nondistillation method of Marcali and Rieman, in which mercuric oxide is used as the catalyst, has been modified to eliminate interference from selenium, making it possible to use selenium as the catalyst. The ammonium ion is titrated with standard sodium hydroxide in the presence of formaldehyde. The method

is accurate for organic compounds in which the introgen is known to be converted quantitatively into ammonium salt by the usual Kjeldahl procedure. D. J. Dennison

Oxygen in Gas

Corcoran, J. T. CONTINUOUS DETERMINATION OF OXYGEN IN GASES. *Anal. Chem.*, 27, 1018-19 (1955) June.

The apparatus described by Brady for continuously determining small amounts of oxygen in gases has been modified to increase precision. Modifications are shown by schematic diagram. D. J. Dennison

Photometry

Porter, P. and Wyld, G. ELIMINATION OF INTERFERENCES IN FLAME PHOTOMETRY. *Anal. Chem.*, 27, 733-736 (1955) May.

A comparison of the effectiveness of a radiation buffer, an internal standard, and a direct-injection burner as a means of controlling certain types of interference. Although these techniques are valuable, it is necessary to have considerable knowledge about the nature of the sample, and the most accurate analyses require standards which are very similar in composition to that of the sample. R. R. Amrine

Sulfides by UV

Drushel, H. V. and Miller, J. F. SPECTROPHOTOMETRIC DETERMINATION OF ALIPHATIC SULFIDES IN CRUDE PETROLEUM OILS AND THEIR CHROMATOGRAPHIC FRACTIONS. *Anal. Chem.*, 27, 495-501 (1955) April.

The Hastings method for determination of aliphatic sulfides, using the intense ultraviolet absorption of complexes of the sulfides with iodine, has been modified to yield greater sensitivity and to allow application of the method to dark samples. D. M. Mason

Hastings, S. H. and Johnson, B. H. SPECTROPHOTOMETRIC DETERMINATION OF ALIPHATIC SULFIDES. Anal. Chem., 27, 564-565 (1955) April.

A procedure for spectrophotometric determination of aliphatic sulfides has been modified to improve its accuracy and reproducibility. Authors' Abstract

Sulfur Method

Hudy, J. A. and Mair, R. D. DETERMINATION OF TRACES OF SULFUR IN ORGANIC COMPOUNDS: VERTICAL FURNACE METHOD. *Anal. Chem.*, 27, 802-5 (1955) May.

A method is described for determining traces of sulfur in organic liquids. It is particularly suitable for the concentration range from 1 to 100 p.p.m. A vertical catalyst-packed furnace is used which is capable of burning from 15 to 30 grams of sample per hour. The sulfur is absorbed from the combustion gases in a hydrogen peroxide solution, after which the excess hydrogen peroxide is decomposed with the aid of a platinum catalyst. The resulting sulfate is then measured by a sensitive conductometric procedure. The method has been applied extensively to terpene hydrocarbons and appears applicable to many other types of compounds. It has a precision and accuracy of about 1 to 2 p.p.m. of sulfur. Authors' Abstract

Lambert, J. L., Yasuda, S. K., and Grother, M. P. COLORIMETRIC DETERMINATION OF SULFATE ION. *Anal. Chem.*, 27, 800-01 (1955) May.

A colorimetric procedure for determining sulfate ion in the range of 0 to 400 p.p.m. is described which uses an insoluble thorium borate-Amaranth dye reagent. Sulfate ion releases dye molecules from the solid reagent in direct proportion to its concentration and is determined by absorbance indirectly as the concentration of the dye at 521 millimicrons. Potentially serious interferences by fluoride, phosphate, and bicarbonate ions are eliminated through the use of added lanthanum ion and a week acid cation exchange resin. Seven water samples were analyzed by this method with the results in good agreement with Standard gravimetric analysis. Authors' Abstract

X-Ray Techniques

Martius, U. M. MODERN X-RAY TECHNIQUES AT THE ONTARIO RESEARCH FOUNDATION. *Can. Chem. Processing*, 39, 102, 4, 6 (1955) May.

The use of x-ray diffraction and x-ray spectroscopy techniques for various problems including the identification of corrosion products is discussed. D. V. Kniebes

8. GENERAL AND PHYSICAL CHEMISTRY

Air Properties

Fong, J. T. SHORT CUT TO AIR RECEIVER DESIGN. *Petroleum Refiner*, 34, 165-7 (1955) April.

A graphical method for sizing air receivers is described and a sample chart based on 100 psi air is given. R. F. Bukacek

Wilson, J. E. and Ludwig, E. E. ENGINEERING WITH HIGH-PRESSURE AIR. *Petroleum Refiner*, 34, 168-70 (1955) April.

A pressure-enthalpy chart for air based on data from Gerhart, Brunner, Mickley, Sage and Lacey, "Mechanical Engineering" April 1942 is presented with sample calculations illustrating its use. R. F. Bukacek

Alumina Properties

Harris, M. R. and Sing, K. S. THE SURFACE PROPERTIES OF PRECIPITATED ALUMINA. *J. Appl. Chem.* (British), 5, 223-27 (1955) May.

Alumina precipitates have been prepared by treating sodium hydroxide with either aluminum chloride, or sulphate, at pH 5. Adsorption isotherms of nitrogen, determined at —196° on the outgassed products, were all of reversible S-type, characteristic of physical adsorption on non-porous solids. Surface areas have been calculated by the usual Brunauer, Emmett and Teller method and related to the conditions of precipitation and subsequent washing. It seems likely that the surface area of activated alumina 1, 2, 5 is limited to about 300 m. ^{2}g.$^{-1}$; it is rather striking, therefore, to find that alumina precipitates may be prepared with areas greater than 400 m. ^{2}g.$^{-1}$. Authors' Abstract

Ammonia Explosibility

Clarke, R. M. and Wright, G. F. THE EXPLOSIBILITY OF WET AMMONIA-AIR MIXTURES. *Can. J. Techn.*, 33, 161-168 (1955) May.

A study has been made of an industrial plant explosion in which flammable ammonia-air mixtures over aqua ammonia were ignited inside storage tanks and piping where a flame or spark could not have been present. It has been found that the temperature of 800° C. inside a pipe which is being arc-welded is insufficient to ignite the flammable mixture unless this hot metal is brought into contact with liquids such as aqua ammonia or very dilute hydrogen peroxide. A detailed description of the accident indicates that this combination of circumstances is sufficient to explain the occurrence. The flammable properties of wet ammonia-air mixtures are summarized here for the first time, in the hope that further accidents of this type may be prevented. Authors' Abstract

Catalytic Oxidation

Hughes, M. F. and Hill, G. R. RATE LAW AND MECHANISM FOR THE OXIDATION OF CARBON MONOXIDE OVER A VANADIUM OXIDE CATALYST. *J. Phys. Chem.*, 59, 388-391 (1955) May.

Data on the oxidation of carbon monoxide over a vanadium oxide catalyst at 377 to 431°C indicate that the reaction follows a Langmuir type rate equation which is independent of oxygen and carbon dioxide partial pressures. The proposed reaction mechanism involves rapid sorption of oxygen on the catalyst surface, yielding vanadium oxide and rapid sorption of carbon monoxide on the oxidized vanadium, followed by a surface rearrangement of VOCO to liberate carbon dioxide as rate controlling. Heats and entropies of activation are estimated. C. G. von Fredersdorff

Gas Conductivities

Rothman, A. J. and Bromley, L. A. HIGH TEMPERATURE THERMAL CONDUCTIVITY OF GASES. *Ind. Eng. Chem.*, 47, 899-906 (1955) May.

A report of equipment design and new experimental thermal conductivity data for N_2, CO_2, A and CO_2-N_2 mixtures at themperatures up to 800° C. R. F. Bukacek

Mass Spectrometry

Farmer, J. B. and Lossing, F. P. FREE RADICALS BY MASS SPECTROMETRY. VII. THE IONIZATION POTENTIALS OF ETHYL, ISOPROPYL, AND PROPARGYL RADICALS AND THE APPEARANCE POTENTIALS OF THE RADICAL IONS IN SOME DERIVATIVES. *Can. J. Chem.*, 33, 861-69 (1955) May.

The ionization potentials of ethyl, isopropyl,

and propargyl radicals have been measured by electron impact on radicals produced by thermal (electric furnace) decomposition of appropriate compounds. The appearance potentials of these ions in various compounds are used to calculate the values of bond dissociation energies. R. R. Amrine

Nier, A. O. DETERMINATION OF ISOTOPIC MASSES AND ABUNDANCES BY MASS SPECTROMETRY. *Science*, 121, 737-44 (1955) May 27.

A general description of the methods and types of instruments used to measure abundances of isotopes is given. A recent summary of atomic weights for all naturally occuring elements is included. D. V. Kniebes

Pilot Fuel Cell

SHORTCUT TO POWER. *Chem. Week*, 76, 50, 52 (1955) May 28.

An oxygen-hydrogen fuel cell has been developed in Britain based on the electron exchange in the chemical reaction between oxygen and hydrogen, for producing electric power. The cell has application for electric railways and for meeting peak demands in electric generating plants. The cell uses nickel electrodes with a 27 percent potassium hydroxide electrolyte. Following successful laboratory operation, the cell is currently in a stage of transition to a prototype size of 2-3 kw. E. J. Pyrcioch

Plastic Permeability

Othmer, D. F. and Frohlich, G. J. CORRELATING PERMEABILITY CONSTANTS OF GASES THROUGH PLASTIC MEMBRANES. *Ind. Eng. Chem.*, 47, 1034-40 (1955) May.

A correlation of permeability constants of gases through plastic membranes is presented in the form of a general nomograph. Fifty five types of membranes for various gases are presented. The basic equation for the nomograph is similar in form to the Clausius-Clapeyron equation, and it relates the permeability of the gas through a given membrane to the temperature. R. E. Peck

Properties of Water

Wellman, E. M. and Sibbitt, W. L. A SURVEY OF SOME OF THE THERMODYNAMIC AND PHYSICAL PROPERTIES OF WATER. *Combustion*, 26, 51-56 (1955) April.

Values of the constant pressure specific heat (c_p). the thermal conductivity (k) and the dynamic viscosity (M) for water have been compiled from the best values available and presented in tabular form. Using these values, the Prandtl modulus (N) has been calculated and tabulated. The properties are for temperatures from 32° F. to 690° F. and for pressures up to 6000 psia. E. J. Pyrcioch

Solar Battery

Prince, M. B. SILICON SOLAR ENERGY CONVERTERS. *J. Appl. Physics*, 26, 534-540 (1955) May.

Theory is given for the design of silicon solar energy converters commonly known as the Bell Solar Battery. Values are given for the various parameters in the design theory. Experimental data are presented and compared with the theoretical relations based on a simple model. It is found that with present techniques, units can be made with up to 6 percent efficiency in the conversion of solar radiant energy to electrical energy. An important factor in obtaining such high efficiencies is the reduction of the series resistance of the cell to as low a value as possible. Author's Abstract

9. ORGANIC CHEMISTRY

Dehydrogenation

Sieg, R. P., and Wellman, H. B. (assigned to California Research Corp.) CATALYTIC CONVERSIONS OF HYDROCARBONS. U. S. 2,706,741 (1955) April 19.

A process is claimed for dehydrogenating hydrocarbons which comprises contacting a feed comprising hydrocarbons having 2 to 8 carbon atoms per molecule at a temperature of about 1100° F. with a catalyst comprising below about 77% of an oxide material of the group consisting of alumina and a mixture of alumina and silica, above about 8% beryllia and about 15 to about 20% of an oxide of a metal selected from the sixth group of the periodic table (Cr, Mo) coprecipitated. (First Claim)

Ethane Pyrolysis

Leigh, C. H., Dzwarc, M., and Bigeleisen, J. THE RATE OF DECOMPOSITION OF ETHANE INTO METHYL RADICALS. *J. Am. Chem. Soc.*, 2193-4 (1955) April 20.

Studies of the decomposition of ethane were

conducted in an electrically-heated silica reaction vessel operating at 750°-850° C. and atmospheric pressure. Excess toluene was employed to quench the methyl radicals from ethane decomposition. The rate of methane production was thus a measure of the ethane decomposition rate. Since the pyrolysis of toluene also produces methane, it was necessary to employ ethane labeled by C^{14} isotope as a tracer. Ethane decomposition appeared to follow a first order rate law at partial pressures of 6-17 mm mercury. Rate constants varied from 12 to 212 inverse seconds over the temperature range 1039-1109° K. These rate constants are considered to be reliable within 50% or less due to poor reproducibility of results. A tentative activation energy of 85-89 k cal per g mole is given. C. G. von Fredersdorff

Petroleum Chemicals

Hughes, T. G. PETROCHEMICAL GROWTH: WILL IT AFFECT OIL AND GAS PRODUCTION? *Petroleum Eng.*, 27, B80, 82-84, 87 (1955) April.

The petrochemical industry has been and promises to continue to be a rapid-growth industry. Vital factors in selecting a chemical-plant location are low cost, long-range raw material supplies, market accessibility, and local considerations such as labor, utilities, and land costs. Individual producers will find the petrochemical industry a good customer. Although the dollar value of petrochemicals is important, the volume of petroleum consumed in their manufacture is too small to have a significant effect on overall oil and gas production.

Author's Abstract

Sherwood, P. W. SYNTHETIC DETERGENTS FROM PETROLEUM SOURCES. *Petroleum* (British), 18, 10-11 (1955) January.

The wide public acceptance of synthetic detergents has caused a major boom in the production of alkyl-aryl sulphonates. This group of compounds today is mainly derived from petroleum sources. According to the United States Tariff Commission fully 56% of the 1950 production of synthetic detergents was based on petroleum. This ratio has been increasing rapidly during recent years. As recently as 1948, other sources of raw materials for synthetic detergents exceeded petroleum in importance.

Author's Abstract

Swaminathan, V. S. ENGLAND'S PETROCHEMICAL GIANT. *Petroleum Proc.*, 10, 703-7 (1955) May.

A description is given of the huge integral petrochemical works of Imperial Chemical Industries. Based on a thermal cracking unit which produces olefins from petroleum distillates, a number of plants at Wilton and Billingham produce a wide variety of petrochemical materials by progressive steps of processing. The present capacity is approximately 6000 bbl./day of the primary raw material, petroleum distillate. J. M. Reid

Phenol Synthesis

PHENOL SUPLUS TO CLEAR UP. *Chem. Eng. News*, 33, 2060, 2062 (1955) May 16.

Although the nation's phenol capacity of 588 million lb is now partly idle, Hercules Powder Co. has expressed its confidence that this and more capacity will be needed and has started operations at its Higgins plant at Gibbstown, N. J. This plant produces 26 million lb phenol and 16 million lb acetone by the cumene oxidation process. Benzene, purchased from the steel industry, is alkylated to cumene by propylene piped in from oil refineries, and the cumene is oxidized by air. Besides phenol and acetone, other products are alpha-methyl-styrene, acetophenone, resorcinol, paracresol and dicumyl peroxide which promises to replace sulfur as a vulcanization catalyst for all forms of rubber.

O. P. Brysch

Polyethylene

Reidel, J. C. PHILLIPS UNVEILS BIG POLYETHYLENE PLAN. *Oil Gas J.*, 53, 53 (1955) May 2.

Phillips Petroleum Company has announced construction plans for a 145,000,000 pound per year polyethylene plant together with a new plant to produce the ethylene raw material. Primary products will be several new polymers which are claimed to have properties superior to present grades of polyethylene plastics. Probably more important to the industry, however, is the introduction of a new low pressure catalytic process for making the polymer. The Phillips process will operate at less than 500 psig as compared to present processed using 15000 to 30000 psig which will result is substantial reduction in capital investment.

J. M. Reid

Reidel, J. C. POLYETHYLENE: READY FOR A BOOM. *Oil Gas J.*, 54, 80-81 (1955) May 9.

U. S. polyethylene producing capacity will be 271,000,000 pounds ahead of consumption this year. This situation is not expected to last very long, however, as the use of this plastic spreads. There are now 10 companies with 13 plants having a combined capacity of 571,000,000 pounds per year. Two of these are planning expansion in 1957. The largest single use of polyethylene packaging film, increased from 45,000,000 pounds in 1953 to an estimated 100-160,000,000 pounds in 1955.

J. M. Reid

Propylene Chemicals

GLYCERINE PAYOFF IN PROPYLENE PARLAY. *Chem. Week*, 76, 72, 74, 76 (1955) May 7.

Shell Chemical Co. plans to start work at Norco, La. on a 30-million lb hydrogen peroxide plant now; it will add an acrolein unit later, and use the two to synthesize glycerine. Among the patented processes known in this field, the liquid phase oxidation of isopropanol (Brit. 708,339) yielding hydrogen peroxide and acetone is likely to be used. Acrolein by catalytic oxidation of propylene (U.S. 2,451,485) could then be reacted to form glyceraldehyde, which would be hydrogenated to glycerine. The acetone may be reacted with phenol to form bisphenol A, which with the chlorohydrin, forms epoxy resin.

O. P. Brysch

10. CHEMICAL ENGINEERING

Absorption

Kelley, R. G. PERFORATED PLATES VERSUS BUBBLE CAPS. *Oil Gas J.*, 53, 128-32 (1955) April 18.

Overall tray efficiency declines markedly with an increase in the number of trays for towers containing over twenty trays. Each component in a mixture gave a different tray efficiency. The greater the volatility of a component, the lower was the tray efficiency based on that material. Data and calculations are presented to substantiate these conclusions.

R. E. Peck

Kennedy, F. G., III, Chancellor, J. N., Jr. and Rahmes, M. H. HOW'S YOUR ABSORBER EFFICIENCY? *Oil Gas J.*, 53, 133-38 (1955) April 18.

Tests on gas absorption were performed in order to obtain the operating characteristics of perforated trays, and the results are compared with bubble-cap trays. Capacity and efficiency of the trays were satisfactory for service in refinery absorbers. No fouling was observed in this relatively clean service. The new installation had a slightly greater capacity than the old bubble trays. Good methods for calculating hole pressure drop, hydrostatic head and sweep point are available. These data make it easy to design a perforated tray with adequate flexibility. The design of a bubble tray is more difficult.

R. E. Peck

Lynn, S., Straatemeier, J. R. and Kramers, H. ABSORPTION STUDIES IN THE LIGHT OF THE PENETRATION THEORY. II. ABSORPTION BY SHORT WETTED-WALL COLUMNS. *Chem. Eng. Science*, 4, 58-62 (1955) April.

The rate of absorption of SO_2 by water in short wetted-wall columns (heights of 1 to 5 cm) with no gas phase resistance has been investigated. When the liquid film emerges through a slit of appropriate width, the entrance effect is negligible and need not be considered in applying the penetration theory to the rate of absorption. However, there is a considerable end-effect which is evidenced by a thickening of the film, accompanied by an apparent stagnation of the surface, on the lower one centimetre of the column. The rate of absorption by this part of the film is relatively low. This phenomenon complicates the analysis of data obtained with short wetted-wall columns, or other equipment with films flowing over small distances.

Authors' Abstract

Lynn, S., Straatemeier, J. R. and Kramers, H. ABSORPTION STUDIES IN THE LIGHT OF THE PENETRATION THEORY. III. ABSORPTION BY WETTED SPHERES, SINGLY AND IN COLUMNS. *Chem. Eng. Science*, 4, 63-67 (1955) April.

A study has been made of the absorption of SO_2 by water flowing in a laminar film over the surface of single spheres and columns of spheres. By means of the penetration theory it is possible

to correlate the data for spheres of radii from 1 to 3 cm, and for columns containing up to fourteen spheres. It appears that there is little or no mixing of the surface layers with the bulk of the liquid as it flows from one sphere to the next in a vertical row. Authors' Abstract

Heat Transfer

Brown, L. S. METALLIC RECUPERATORS. *Coke and Gas* (British), 17, 108-10, March; 152-5 (1955) April.

Various arrangements are shown of metallic, particularly cast iron, recuperators for horizontal and vertical gas flow in connection with industrial furnaces. C. G. von Fredersdorff

de Coriolis, E. G. HIGH SPEED HEATING OF STEEL FOR PLASTIC DEFORMATION. *Blast Furn. Steel Plant*, 43, 320-24 (1955) March.

The fundamentals involved in transfer of heat to a cold metal surface are discussed for gas-fired furnaces. The proper relationship of the contribution of convective heating from the turbulent gases to the total heat transfer is shown with the aid of graphs. The limiting effect of the specific conductivity of the metal upon the rate of heating is explained from the standpoint of billet sections and surface oxidation. High speed heating in early stages, with final heating into the billet core using restricted input and surface temperatures limited to 2200-24500° F., is recommended for best results in the shortest heating time.

O. P. Brysch

Mueller, A. C. THERMAL DESIGN OF SHELL-AND-TUBE HEAT EXCHANGERS FOR LIQUID-TO-LIQUID HEAT TRANSFER. Purdue Eng. Exp. Stat. Bull. No. 121 (1954) September.

A comprehensive presentation of the design fundamentals and methods of calculation for tube and shell, liquid to liquid heat exchange equipment is given in this bulletin. The more accurate trial and error solutions for heat exchanger design are used instead of the short cut methods often employed by experienced engineers and exchanger manufacturer and therefore it is an excellent text for the student or one who is not entirely familiar with the basic factors affecting heat exchange equipment. Design data is conveniently collected in tabular and graphical form and methods of applying theoretical calculations to actual exchanger design is clearly presented in useful handbook style. J. M. Reid

Spray Scrubbers

Johnson, G. A., Friedlander, S. K., Dennis, R., First, M. W., and Silverman, L. PERFORMANCE CHARACTERISTICS OF CENTRIFUGAL SCRUBBERS. *Chem. Eng. Progress*, 51, 176-188 (1955) April.

The performance of an experimental cyclonic scrubber and a commercial dynamic spray scrubber (Hydro Volute scrubber) have been investigated for cleaning air loaded with dust particles and results are presented. It was found that the use of a water spray increases dust-collector performance by particle conditioning and particle collection. Efficiency was found to increase logarithmically with meter rate. Efficiency also increased with increases in air volume. Spraying countercurrent to air flow was more effective than concurrent spraying but the operating power requirements were higher. The mean drop size of the most effective spray nozzle has been estimated as about 50 to 100 mu in diameter. E. J. Pyrcioch

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Dew Point Gage

Boyle, J. R. (assigned to Illinois Testing Lab.) DEW POINT MEASURING APPARATUS. U. S. 2,709,360 (1955) May 31.

This invention relates to an apparatus for measuring the dew point of a gas in which a condensing surface is held to constant temperature while the gas is injected until the pressure reaches the level where condensation begins.

R. F. Bukacek

Flowmeter

Rumbel, R. C. A SUBSURFACE FLOWMETER. *J. Petroleum Techn.*, 7, 53-56 (1955) March.

A subsurface flowmeter has been developed for use by wireline equipment for measuring flows from 4 to 15 bbls of liquid per day. Embodying a rotometer flow measuring element and an inflatable packer which diverts all flow through the rotometer, the device has proven to be reasonably successful in the field. The principle

source of trouble encountered has been loose sand which causes fouling of the instrument.

B. E. Eakin

Leak Gage

Kent, T. B. A HYDROGEN PIRANI LEAK DETECTOR USING A CHARCOAL TRAP. *J. Sci. Instr.* (British), 32, 132-34 (1955) April.

A cheap and robust dynamic leak detector for continual vacuum testing is presented in this paper. Hydrogen is used as a probe gas with a charcoal trap placed between the component and a Pirani gage in order to eliminate irregular pressure pulses caused by impurities and to increase the response. This equipment is capable of detecting a leak of 10^{-8} u/s within five minutes of evacuation.

A. J. Tulis

Process Heating

Eyth, W. S. and Faber, R. L. TAKE A LOOK AT ELECTRIC HEATERS. *Chem. Eng.*, 62, 191-94 (1955) April.

It is stated that the four basic types of electric heaters,—tubular, fin-strip, cartridge, and strip—are sufficiently versatile to satisfy many process needs, and have therefore taken a substantial portion of the process heating load. Proposed uses for resistance heating and claimed advantages are listed. New types of units such as those designed to provide for infrared radiation are discussed.

E. F. Searight

Water Supply

Dick, I. B. PLANT ATTACKS SILICA PROBLEM WITH MONOBED DEMINERALIZATION. *Power*, 99, 82-85 (1955) May.

The problem which silica presented at Consolidated Edison's Waterside Station justified considerable investment in a search for a silica remover. This resulted in the purchase of a monobed demineralizer, with the cost of operation at $10.00 per million pounds of water treated. This includes only chemical and process-water costs.

S. Volchko

12. MATERIALS OF CONSTRUCTION

Coatings

Smith, A. Q. TWO NEW ALUMINUM COATINGS IN USE. *Ind. Gas*, 33, 3, 4, 22-23 (1955) April.

The article describes two aluminum coating processes used during the war, which have recently been released for commercial use. The first "Alumibond" is basically a casting process, used extensively by aviation and automotive industries. The second, "Alumicoat", is a dipping process by which steels are given the ultimate protection against oxidation and corrosion, especially at high temperatures. A few uses for this process are ship's boilers, hot-air tubes, jet aircraft components and many others.

J. G. Chalcraft

Corrosion Causes

Kulman, F. E. CAUSES OF FERROUS PIPE CORROSION. Am. Gas Assoc., Oprtg. Sect. Paper DMC-55-4 (1955) April 12.

The results of a questionnaire on the causes of corrosion sent out by the Operating Section Corrosion Committee are summarized. The experience of 28 companies is included in these summary. The results indicated a need for better methods of detecting corrosive soil. The Starkey and Wight redox probe for determining soil corrosivity is described and its uses are outlined.

G. G. Wilson

Maintenance

Wadleigh, F. R. MAINTENANCE OF CHECK POINTS IN A MANUFACTURED GAS PLANT. *Gas*, 31, 53-56 (1955) April; 51-54, May.

In the maintenance of a coal and water gas plant facility some points of potential trouble are described. Specific areas and equipment, corrosion, wear, as well as safety factors are treated.

W. G. Bair

Welding Technique

Curran, R. M. and Rankin, A. W. PREVENTING WELD CRACKS IN 1100° F STAINLESS PIPING. *Heating, Piping and Air Cond.*, 27, 116-19 (1955) April.

A new welding technique is described by which type 347 welds can be made insensitive to embrittlement at 1100° F. and above. A chemically balanced low ferrite electrode is used, followed by rapid heat treatment at 1925° F.

R. F. Bukacek

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Chemist
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Chemistry and Industry
Coal Heat
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Corrosion
Current Chemical Papers (Chem. Soc., London)

Drilling

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Endeavour
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Industrial Finishing
Industrial Gas (American)
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Institute of Gas Technology Publications
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Institution of Gas Engineers. Bulletins, Communications and Transactions
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